

Name of the Student: \_\_\_\_\_

Max. Marks : 25 Marks

Time : 25 Minutes

Mark Schemes

**Q1.**

(a)

| A | B | a | b | c | d | e | f | g | Display |
|---|---|---|---|---|---|---|---|---|---------|
| 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | L       |
| 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | S       |
| 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | S       |
| 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | H       |

1 mark for row L

1 mark for row S (both)

1 mark for row H

3

(b) EXOR gate

1

(c) (i) Different combinations produce different brightness

1 Disadvantage

1

(ii)  $R = V/I$ ;  $(5V - 2.2V) / 20mA$ ;  $2.8V / 20mA = 140\Omega$ 

1 mark for 2.8V drop

1 mark for answer

2

(iii)  $E24 = 150\Omega$ 

1 mark for answer

1

(8)

**Q2.**(a)  $D = C + B$ 

1

$$E = \overline{A}$$

1

$$G = \overline{A+B}$$

(b)

| INPUTS |   |   | INTERMEDIATE OUTPUTS |   |   |
|--------|---|---|----------------------|---|---|
| C      | B | A | D                    | E | G |
| 0      | 0 | 0 | 0                    | 1 | 1 |
| 0      | 0 | 1 | 0                    | 0 | 0 |
| 0      | 1 | 0 | 1                    | 1 | 0 |
| 0      | 1 | 1 | 1                    | 0 | 0 |
| 1      | 0 | 0 | 1                    | 1 | 1 |
| 1      | 0 | 1 | 1                    | 0 | 0 |
| 1      | 1 | 0 | 1                    | 1 | 0 |
| 1      | 1 | 1 | 1                    | 0 | 0 |

2 marks for each of correct columns D & G

1 mark for column E

5

(Total 8 marks)

Q3.

(a)

| INPUTS             |                 |                   | OUTPUTS              |                     |                     |
|--------------------|-----------------|-------------------|----------------------|---------------------|---------------------|
| Tunnel Sensor<br>T | Car Sensor<br>C | Lorry Sensor<br>L | Message Display<br>M | Red Stop light<br>R | Green Go light<br>G |
| 0                  | 0               | 0                 | 0                    | 0                   | 1                   |
| 0                  | 0               | 1                 | 0                    | 0                   | 1                   |
| 0                  | 1               | 0                 | 0                    | 0                   | 1                   |
| 0                  | 1               | 1                 | 1                    | 1                   | 0                   |
| 1                  | 0               | 0                 | 0                    | 1                   | 0                   |
| 1                  | 0               | 1                 | 0                    | 1                   | 0                   |
| 1                  | 1               | 0                 | 0                    | 1                   | 0                   |
| 1                  | 1               | 1                 | 1                    | 1                   | 0                   |

Column M – 2 marks

Column G – 2 marks

(b)  $R = T + (C.L)$

1 mark for terms

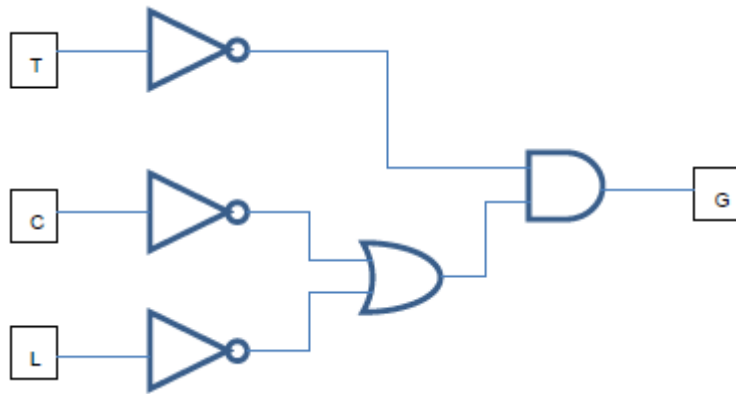
1 mark for OR

Or for full expression  $S = T + (\bar{T}.C.L)$

Max 1 mark

2

(c)



3

(Total 9 marks)